

Alternative 4 - Tunnel under the MBTA Rail Line

This option proposes a tunnel under the existing rail line near West Concord Station. Borings would be necessary to determine the subsurface soil and the presence of ledge and/or groundwater prior to proceeding with this alternative. At West Concord Station, the tracks are at ground elevation. The tunnel would still need to be between seventeen (17) and nineteen (19) feet under the existing tracks requiring a ramp between three hundred forty (340) and three hundred eighty (380) feet in length with a 5% grade. The grade could be increased to 8.33% with level landings provided every thirty (30) feet. However, this grade is quite steep for many riders and walkers. As with option 3A, there is insufficient distance between the rail line and Main Street for the tunnel to reach existing ground. The tunnel would therefore need to cross under both the active rail line and Main Street before climbing up to existing ground unless the Town opted for a switchback ramp system allowing the tunnel to ascend to existing ground.

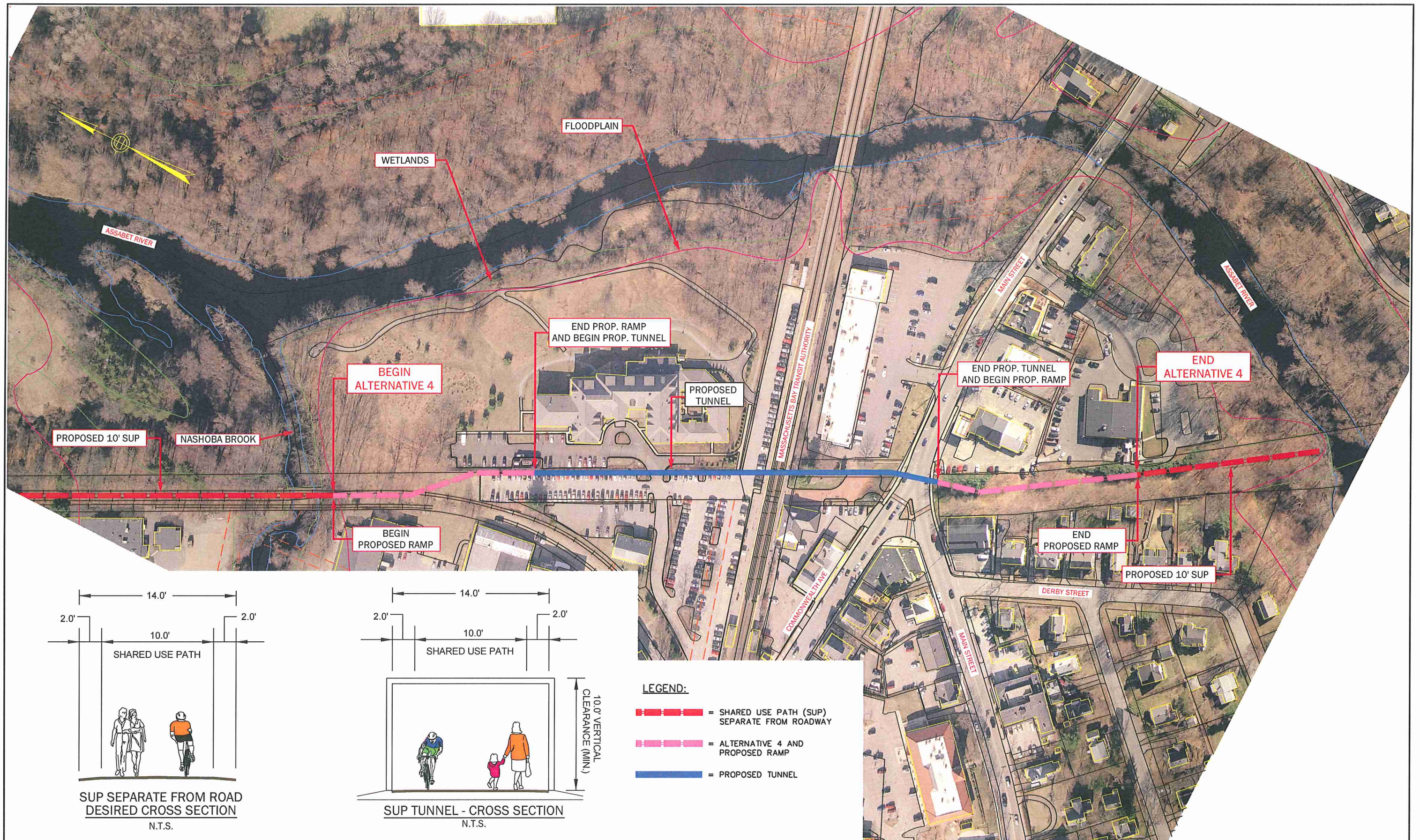
The MBTA did indicate at a meeting held on July 13th that they would not allow for the loss of any parking or allow bikes to ride through the parking lot. Concord Zoning Bylaw requires full size parking spaces to be 9'x18' with a 24' aisle width to accommodate two-way traffic. The existing parking lot is approximately fifty (50) to fifty-one (51) feet in width at the northern limits and allows for two rows of 90° parking. With a required width of 60 feet the existing parking lot does not meet the Zoning Bylaws. A tunnel could not be incorporated in the existing lot without taking parking.



The MBTA parking between the tracks and Concord Park is approximately thirty-nine (39) feet in width. The area allows for one row of 90° parking. Concord Zoning Bylaw requires forty-two (42) feet to accommodate this parking. The existing parking area does not meet the Zoning Bylaws and a tunnel could not be incorporated in this area without taking parking. It should be noted however that the State is exempt from local zoning bylaws.

There is an eight (8) to nine (9) foot gap between the edge of the MBTA lot and the Concord Park parking lot. Since this is insufficient width for the tunnel, the tunnel would need to begin just after crossing the Nashoba Brook Bridge. Beginning the descent here would allow for the tunnel to be underground prior to reaching the existing parking facilities and prevent loss of any parking. The tunnel would continue descending to reach the required depth under the active rail line. After the tunnel crosses under the tracks, it could slowly begin climbing to reach existing ground south of Main Street. The ramp and tunnel system would be between 1,000 and 1,500 feet in length.

There is insufficient distance, only one hundred seventy (170) feet, between the MBTA Tracks and Main Street. However, if the Town desired, a switchback ramp system could be utilized between the MBTA tracks and Main Street to have the tunnel surface before Main Street. This option produces blind corners and forces trail users to dismount and walk their bikes. See Figure 9 on the following page.



ALTERNATIVE 4 - CONCEPTUAL PLAN
TUNNEL UNDER THE MBTA RAIL LINE
CONCORD, MA

FIGURE 9

SCALE: 1" = 80'

Lighting and ventilation would be required in either tunnel option. Railing and retaining walls would also be required. A pumping system would likely be necessary depending on the water table

The Concord Park right-of-way is owned by VOA Concord Assisted Living Inc. The MBTA Commuter Rail parking lot is owned by EOTC. The Boston Gas Company owns a strip of land parallel to and abutting the EOTC right-of-way on the east between the tracks and Main Street which conveys a gas main under the surface.

Alternative 4 Summary

EVALUATION CRITERIA

Effectiveness

This alternative does provide a straight and direct route for the BFRT under the rail line. With a direct route, the trail through the tunnel would be followed by most trail users. However, the idea of traveling through the tunnel and being isolated underground may be problematic for some trail users depending on the time of day and if they were traveling alone. These users may avoid the tunnel and travel above ground through the existing MBTA parking lot and across the existing crossing. A fence may be necessary to prevent this movement.

Short-term and Long-term Reliability

If maintained this alternative does present a reliable alternative for crossing the MBTA rail line. Studies have shown that tunnels are generally only closed if there are flooding issues.

If the switchback ramp system was selected, trail users may not dismount and walk their bikes through the ramp system ascending from the tunnel. Enforcement of this requirement may be difficult.

Short-term and Long-term Maintenance Costs

The maintenance costs mentioned earlier in this report apply to this alternative also. The annual maintenance cost for a trail is approximately \$1,500/mile. The long-term paving cost would be approximately \$80,000/mile the first time and \$130,000/mile the second time.

It should also be emphasized that structures must be inspected on a recurring basis. Although this inspection should occur yearly, studies have shown the average inspection interval is four years. The maintenance associated with a 1,000 to 1,500 foot long tunnel could be very substantial. A continually operating ventilation system would be required, as would extensive lighting. These systems would require frequent maintenance and periodic replacement. The tunnel will be below the water table and require pumping and drainage to keep the tunnel dry and reduce water infiltration. Generally tunnels that are below the water table will develop leaks and require periodic repairs at construction and expansion joints.

Difficulty in Implementing

It should be noted that the MBTA would support the tunnel option providing MBTA service would not require suspension. This however does make construction more difficult.

If the switchback ramp system were selected, this alternative may require a Design Exception for sight distance requiring the preparation of a Design Exception Report and approval by the Design Exception Committee. This alternative would require discussion and/or meetings with both the AAB/ADA Coordinator and the Bicycle/Pedestrian Accommodation Engineer at Mass DOT. At

this time, it is unknown whether or not this option would be approved by MassDOT. In discussions with MassDOT regarding this report, they had indicated that they would need a formal submission in order to evaluate any alternative and make any decisions. The cost of this alternative would also weigh in heavily on MassDOT's decision and it is likely that this alternative would not be approved by MassDOT due to its cost.

Depending on the location of the tunnel, this option may require right-of-way from Concord Park after crossing the Nashoba Brook Bridge and would require an easement from the MBTA to cross under their rail line. It would also require an easement from EOTC.

Although the tunnel will be located under the parking lots, construction of the tunnel will cause disruption to the parking lots.

With federal funds being allocated towards the construction of the BFRT, a Categorical Exclusion (CE) Checklist would be required. Since work will be proposed within the Riverfront Area of Nashoba Brook, a Notice of Intent must be filed with the Concord Natural Resources Commission. It is possible that an Environmental Notification Form (ENF) would also be required assuming that this would be constructed as part of the Concord BFRT and not independently. It should be noted that these permits will be required regardless of this alternative.

Since this option proposes a very long tunnel, the public process may prolong the design. A tunnel may not be accepted by the public.

Cost to Design and Implement

The design cost for Alternative 4 would be approximately \$1.25 to \$1.5 million.

The construction cost of this tunnel would be in the vicinity of \$20 million making the total construction cost for Alternative 4 in excess of \$25 million. The presence of rock, or a high water table could increase the construction cost tremendously.

Risk to Public Safety

Rail-Trail Maintenance & Operation published by the Rails to Trails Conservancy Northeast Regional Office states that approximately a quarter of constructed trails of the 100 trails surveyed reported illegal activities unique to bridges and tunnels including climbing and jumping from bridges, graffiti and vandalism. Although this alternative does remove the potential for trail user/motor vehicle conflict, with the length of the tunnel being in the vicinity of a quarter of a mile, trail users would be isolated underground. This provides safety concerns. Providing long sight lines is a crucial aspect of tunnel design. To ensure both perceived and actual safety, a user should be able to see the far end of the tunnel when they enter it. This design would not allow that.

If the switchback ramp system was selected, trail users may not dismount and walk their bikes through the tunnel creating a potentially dangerous situation.

If the switch back ramp system is selected, trail users will be put in contact with motor vehicles at the Main Street crossing.

Vehicular Impacts

If the switch back ramp system is selected, trail users will be put in contact with motor vehicles at the Main Street crossing. During construction, vehicles will be impacted in the MBTA Commuter Rail parking lot and Concord Park's parking lot.

Benefits to the Community

This alternative would provide a continuous, direct route for the BFRT. However, it would not bring trail users directly to the West Concord businesses or MBTA Commuter Rail Station unless the switchback ramp system was selected.

Timeliness to Implement

Design of a tunnel would require extensive MassDOT and MBTA review.

Assuming the design and construction is completed as part of the BFRT Phase 2C and the abutters are amenable, the design could be completed within 24 to 30 months. The construction would take approximately 30 to 36 months.

Context Sensitive Aesthetics

Aesthetic features could be added to the tunnel. Since the tunnel would be underground it would not detract from the existing West Concord community setting. The ramp system descending and ascending from the tunnel however would create a very large hole in West Concord Village.

